

Sandia researchers shooting for 'smart gun'

Weapons would allow only authorized users to fire them

By Howard Kercheval

Lab News Staff

In keeping with efforts to turn swords into plowshares, Sandia researchers are working to apply sophisticated surety techniques designed for nuclear weapons during the Cold War to the escalating street violence US police officers experience every day.

Wide-eyed kids watching cowboy movies in the 1950s gasped with anxiety when the bad guy knocked down the hero and jumped on his horse to make a getaway. But they cheered wildly when the dazed hero whistled a special signal and the loyal horse bucked the bad guy off and trotted obediently back to its master.

Police officers enthusiastic

The concept of so-called "smart guns" draws similar, if more sedate, enthusiasm from police officers today as they envision themselves or partners unexpectedly at the wrong end of their own weapons, but realize they're safe because their guns recognize that the hands wrapped around their grips and the fingers tugging at their triggers aren't those of their masters.

Doug Weiss of Power Electronics and Custom Controllers Dept. 2314, who's leading Sandia's National Institute of Justice-funded multi-year research into ways to adapt existing

(Continued on page 5)



GUN SCHOOL — Doug Weiss, left, and Dale Brandt (both 2314) discuss pros and cons of different technologies that might be applied to "smart" guns that could distinguish who is and who is not authorized to use them. Dale is holding a model used to demonstrate the technology to interested groups.

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Sandia National Laboratories

Sandians share in industry royalties for inventions in commercial products

Licensing program honors 13 innovations, 46 Sandians

If Sandians have ever needed an incentive to carry their research forward another step or two toward a useful commercial product, they now have it.

After a small start a year ago, the Sandia royalties program is now recognizing Sandians in considerable numbers. The honors include distribution of royalty payments to Sandia inventors and authors and to their departments and divisions.

Forty-six Sandia employees were recently recognized for developing computer software or inventing products that are now helping industry — 13 innovations in all. (See "Thirteen Sandia technologies in new products" on page 6.)

The ceremony, which took place the evening of Dec. 9 in Albuquerque, was hosted by Sandia President Al Narath, who gave out the awards. Executive VP Jim Tegnelia and VPs Paul Robinson and Gerry Yonas participated. Al MacLachlan, DOE's new Deputy Undersecretary for Technology Partnerships and Economic Competitiveness, gave the keynote address.

Sandia has issued more than 60 commercial licenses since the program began in 1989, 40 of which were issued since January 1993. They have benefitted both large and small companies throughout the US, says Vic

Chavez, Manager of Licensing Support Dept. 4203. The licensing program was authorized by the National Competitive Technology Transfer Act of 1989.

"When we have a new technology that can be protected by patent or copyright, we seek that protection and offer the technology to industry for commercialization," Vic says. "We want to ensure that the new technology has the maximum impact in that it does the most good possible for industry and particularly the American people."

(Continued on page 6)

"We want to ensure that the new technology has the maximum impact..."

Supercomputing speed record again belongs to Sandia and Intel

By Ken Frazier

Lab News Managing Editor

The world's supercomputing speed record is back in the hands of Sandia and Intel scientists.

A Sandia/Intel team first set the record last spring (*Lab News*, May 27, 1994), using Sandia's new Intel Paragon XP/S massively parallel supercomputer, only to see it eclipsed a few months later by Japanese scientists using a specialized one-of-a-kind computer.

Just before Christmas a new Sandia/Intel group recaptured the record, and by a befittingly super-sized margin. This time they linked two Paragon supercomputers into a distributed system, and leapfrogged the Japanese performance record by more than 50 percent.

Last spring's record — on a widely recognized massively parallel benchmark problem called Linpack — was 143.3 gigaflops. (A gigaflop is a billion floating point operations per second.) Last summer the Japanese Fujitsu numerical wind tunnel computer eclipsed that mark with a speed of 170.4 Gflops.

The newly achieved record is 281 Gflops on the Linpack benchmark, and 328 Gflops on a similar calculation important in electromagnetic signature calculations, which use complex arithmetic. (The world record on this

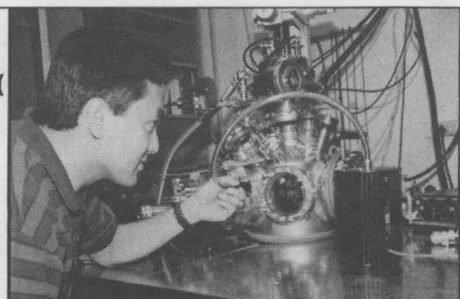
(Continued on page 5)

Sandia takes a record five Basic Energy Sciences awards

4

Labs teams with Walt Disney Co. in research alliance

9



This & That

Good morning! — I now have a new personal definition of a “good morning” on weekdays. It’s coming into the office, checking my computer, looking at my fancy phone, and finding that I don’t have a single voicemail message or e-mail message.

* * *

Mushrooms best on pizza — I couldn’t help thinking about an early proposed Sandia corporate emblem when the US Postal Service announced in mid-December it was dropping its plan to issue a “mushroom cloud” stamp commemorating the end of World War II.

Several years ago, someone at the Labs gave me a copy of an early-days proposed Sandia emblem that included a mushroom cloud. I don’t know the entire history of it, but I still have the copy. The emblem was proposed in 1948 when Sandia was operated by the University of California as a branch of Los Alamos Laboratory. The emblem was basically a mushroom cloud — obviously generated by a nuclear explosion — superimposed over a world globe, with lettering including “Sandia Laboratory” and “University of California.” It wasn’t adopted, but I don’t think it would’ve lasted long even if it had been adopted.

* * *

Which half to believe? — It was a fast, furious rush of news and rumors about the Department of Energy, its labs, and their futures last month and early this month. Information coming from the President, Congress, DOE officials, and writers by the dozen seems overwhelming. DOE budget cuts seem likely, but exactly how they will affect Sandia is still a big question mark and probably will be for some time. The only thing that’s certain now is that nothing is certain yet. We’ll be talking with the Labs’ top management very soon to discuss potential effects on Sandia. Stay tuned. In the meantime, much information is conflicting and confusing, so believe about half of what you read and hear. The real problem, of course, is determining which half to believe.

* * *

“Real movers” named in next issue — I asked in the last issue for folks to contact me if they think they may have the record for having the most Sandia office locations and/or the record for the most moves in the past 10 years. Entries were still dribbling in at deadline time, so we’ll publish the names of the record holders in the next issue. If you think you have a record, send me a note at MS 0413 or fax it to 844-0645. A “move” must involve a room or building number change.

* * *

Speedy driver — I enjoy a good bumper sticker. Here’s one I saw recently on the back of a battered old pickup: “I’m not loafing. I work so fast I’m always finished.” I may make that into a sign for my desk.

* * *

Early retirement for me? — As a former President used to say, let me make this perfectly clear: I have heard nothing — absolutely nothing — about any early retirement scheme for any Sandians, and I don’t want to be the source of any rumors on this subject. However, my own early retirement plans may be looking up. I’m only 50, but I hear behind my back that the *Lab News* staff and my boss are thinking about taking up a collection for me if I’ll agree to retire early. What a thoughtful group! It’s great to be held in such high esteem.

— Larry Perrine

Martin Marietta and Lockheed merger is on schedule

Business sectors to be headquartered in Maryland

The proposed merger of Martin Marietta and Lockheed is on schedule and is expected to close in the first quarter of 1995, according to a recent announcement from Martin Marietta headquarters.

Martin Marietta’s transition team co-chairman Mike Smith also reported that a decision has been made to headquarter all four of the new company’s business sectors — Aeronautics, Space & Strategic Missiles, Electronics, and Information & Technology Services — at the current Martin headquarters in Bethesda, Md. “We felt that the Bethesda location was the best choice because of its proximity to many of our government customers,” Smith said.

The Dec. 19 announcement said both companies were nearing completion of their responses to the Federal Trade Commission’s (FTC) “second request” for information, and a preliminary joint proxy statement/prospectus was nearing the end of review by the Securities and Exchange Commission (SEC).

After both companies have complied with the FTC’s second request, the government has 20 days to complete its review unless the companies and the FTC agree to an extension.

Sometime after the proxy statement/prospectus has been reviewed by the SEC, shareholders will be given a chance to vote on the merger.

Martin Marietta has managed Sandia National Labs under its wholly owned subsidiary, the Sandia Corporation, since Oct. 1, 1993.

Sympathy

To Mike Eaton (13316) on the death of his mother, Dec. 14.

To Mark Harrington (6212) on the death of his mother, Dec. 11.

To Tom Martin (1211) on the death of his father, Wilbur Martin, in Riverside, Calif., Dec. 1.



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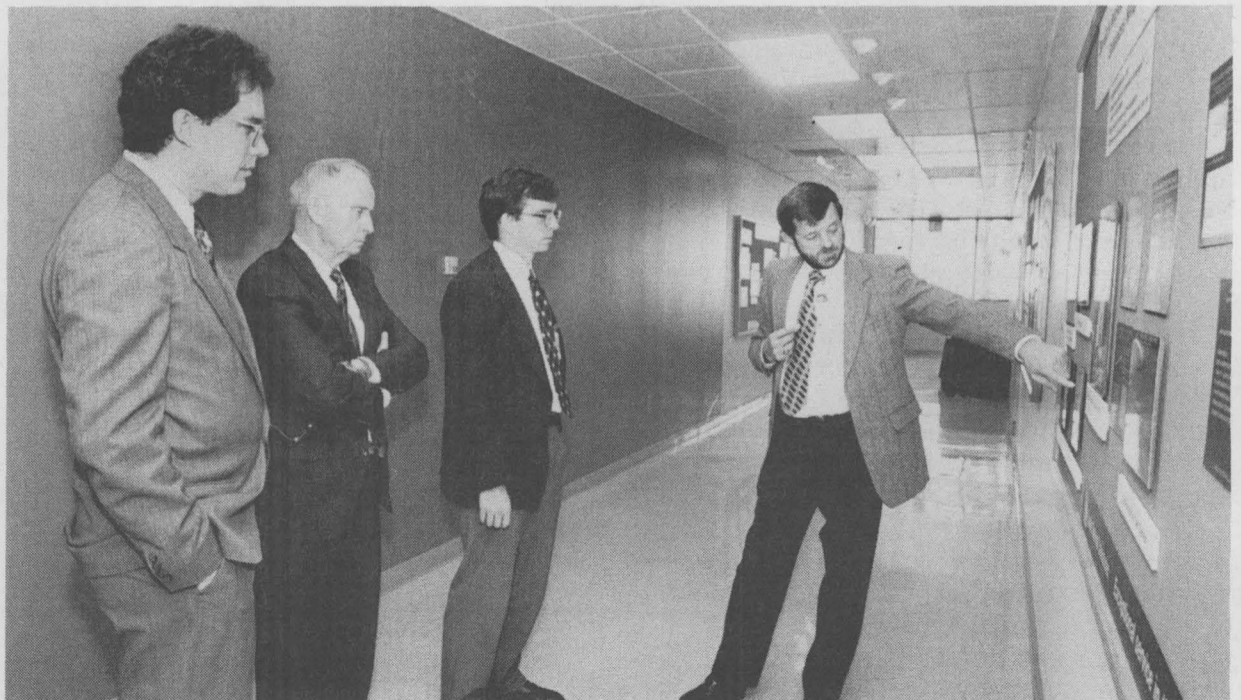
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MARTIN MARIETTA



DOE VISITORS — Chuck Gwyn (1302, right) explains an exhibit about Sandia’s work with SEMATECH to Al MacLachlan (arms folded), new DOE Deputy Undersecretary for Technology Partnerships and Economic Competitiveness, during a December visit to Sandia. MacLachlan joins DOE after a 36-year career with DuPont, most recently as Senior Vice President of DuPont Research and Development. With MacLachlan are (at left), Bill Valdez, DOE technology transfer specialist, and (center) David Cheney, a DOE consultant. The DOE visitors received a Labs overview from Sandia President Al Narath and had briefings on quantum manufacturing, repetitive high-energy pulsed power, Technology Ventures Corporation, and biomedical technologies. That evening MacLachlan spoke at the Sandia Royalty Awards Ceremony (see story on page one).

Sandia ends all Tritium Research Lab operations

Work once done at California site lab to be pursued elsewhere

By Nancy Garcia

California Reporter

Sandia has officially ceased tritium operations at its Tritium Research Laboratory, ending 17 years as a special nuclear materials site.

The \$12 million facility was the safest and most advanced in the country when it opened in 1977. It always remained in compliance with the strictest regulatory requirements and received two recent quality awards from Sandia President Al Narath.

However, the decision to end tritium operations was made in 1991 for two reasons. It will save operating costs, and research on

safely containing tritium (a hydrogen isotope used to increase yields in fusion reactions) can be conducted elsewhere.

Los Alamos National Laboratory and the Savannah River plant in South Carolina continue to study how metal alloys and other materials can contain tritium without becoming brittle or cracked. Some \$10 million of equipment was shipped from Sandia to Los Alamos and the Savannah River site for continued tritium research, avoiding about \$100,000 in landfill burial costs at the Nevada Test Site.

Fifteen Sandia employees who have worked on the transition are expected to shift to work elsewhere at the Sandia/California site. Part of the Tritium Research Laboratory is already being used by health physics staff, and the

"The project has gone extremely well, and we are pleased to have reached this milestone."



PACKING IT AWAY — Contractors Gus Martin (left) and Jerry Parker pour absorbent packing material into drums being prepared for shipment. They have been clearing out Sandia's Tritium Research Laboratory, making it into a nonnuclear, low-hazard facility.

remaining space can be used by a number of different research groups.

The facility was the first to use three highly efficient containment methods (glove boxes and systems to remove tritium from the glove

box environment). It is also the first in the DOE complex to be cleaned up and prepared for new users by the employees who operated the facility. The last tritium was shipped to the Nevada Test Site on Oct. 1.

"The team is four months ahead of schedule," said Tritium Management Dept. 8281 Manager Jim Bartel. He said doing the work in-house should save about \$20 million.

Sandia uses an independent assessment group, based in Albuquerque, to verify the process. Operations also undergo DOE review twice a year.

The Tritium Research Laboratory handled 1.2 million curies during its peak of operation in the mid 1980s and employed up to 20 people. Tritium gas emits low-energy beta particles and can be inhaled or absorbed through the skin.

Average radiation dose insignificant

Workers at the facility received an insignificant average radiation dose in 1994 equivalent to a chest X-ray or about 10 percent of the natural background radiation, Jim says.

The lab must notify the US Environmental Protection Agency of any nonroutine release of 100 curies or more in 24 hours. Jim doesn't expect the facility to release that much radiation during this entire year as the last equipment is removed. In 1993, releases totaled only 188 curies.

Ron Detry, Director of Engineering Services Center 8200, praises the transition effort, saying, "In my view, the cleanup of the Tritium Research Laboratory has been highly successful in a number of ways. The project is ahead of schedule and under budget.

"But perhaps more important," he continues, "the inherently risky job of disassembling the protection systems in the laboratory has been accomplished with no increase in exposure to personnel and with continued decreases in the emissions from the laboratory to the air and water. So in all respects, the project has gone extremely well, and we are pleased to have reached this milestone of no accountable tritium and reclassification as a nonnuclear facility."

Sandia California News

Bill Bonivert elected president of American Electroplaters Society

Bill Bonivert of Materials Synthesis Dept. 8716 has been elected president of the American Electroplaters and Surface Finishers Society (AESF).

The 8,000-member society, with 85 branches, is an international organization that advances the science of surface finishing to benefit industry and society through education and information.

Bill, a 32-year employee of Sandia/California, says the surface finishing industry contributes \$47 billion to the annual gross domestic product, one percent of the US total. Its major markets are automotive, consumer durable, electronics, aerospace, and medical. He says a wide variety of products in these markets are made better through surface finishing.

"The industry was recently selected by the Environmental Protection Agency [EPA] as one of six industries to participate in EPA's new Common Sense Initiative [CSI]," he says. "Our industry is the only one of the six industries selected that impacts the other industries. The theme of CSI is cleaner, cheaper, and smarter."

Bill says working at Sandia puts him at the forefront of the technology. His department is moving into a new facility, the Integrated Manufacturing Technologies Laboratory, designed with a "closed loop" in which rinse

water is continuously filtered and re-used rather than discharged into the sewer system. He said Sandia's own chemistry labs and manufacturing and engineering capabilities have allowed his department to design an ideal system.



BILL BONIVERT

Atoms to aerogels: Sandia wins a record five DOE Basic Energy Sciences/Materials Sciences Awards

Labs researchers dominate the competition

By Ken Frazier

Lab News Managing Editor

Sandia has always done well in the friendly competition among DOE laboratories for DOE Basic Energy Sciences/Materials Sciences Awards, but this time the Labs really outdid itself.

Sandia researchers won five of 1994's nine awards — the most ever by a single laboratory.

"Never before has any one institution so dominated our competition. Congratulations," said Robert Gottschall, Acting Director of the Division of Materials Sciences at DOE's Office of Basic Energy Sciences, in his letter congratulating George Samara (1103/1152), Sandia's BES/MS Program Manager.

"Obviously, we're very proud of this accomplishment," says George. "It is a reflection of the quality of Sandia's research program."

Sandia swept all three award categories in Metallurgy and Ceramics and won one each in Solid State Physics and Materials Chemistry.

Two of the basic research advances are highly relevant to making semiconductors for microelectronics, one brought a fundamental new understanding of the movements and interactions of atoms on surfaces, one discovered a new mechanism for the formation of two-dimensional alloys, and one produced a much improved way to make aerogels — ultralow-density materials so insubstantial that they consist mostly of empty space yet have wide potential applications (superinsulation, catalysts, and low-loss dielectrics are a few examples).



WINNING SCIENCE — It's just one of the five Sandia teams that won 1994 DOE Basic Energy Sciences/Materials Science awards, but it's the biggest one. This group was among the Sandians who won the award for sustained outstanding research for metallurgy and ceramics. From left, Kevin Horn (9351), Bruce Kellerman (University of Texas graduate student), Dan Buller (1111), Arnold Howard (1322), Jerry Floro (1112), Tom Picraux (1102/1112), Tom Mayer (1114), and Eric Chason (1112). Group members not seen include Jay Penn (1112), David Brice (ret.), Jeff Tsao (1311), and Peter Bedrossian. Four other Sandia groups also won 1994 awards.

"Materials science is an essential capability at Sandia underpinning nearly all our technical work," says Peter Mattern, Director of Core Competency Support Center 1010. "It is extremely gratifying to see that our work in

this field stands out among the best."

Sandia is accustomed to leading the DOE labs in materials science awards, but George says this is the first time Sandia came away

(Continued on next page)

Sandia's record five 1994 Basic Energy Sciences awards

Here are the 1994 Basic Energy Sciences/Materials Sciences Awards Sandians won, their recipients, and brief summaries of the projects' significance:

1. Outstanding Scientific Accomplishments in Metallurgy and Ceramics: "Discovery of Two-Dimensional Alloys in Metallic Superlattice Films." Bob Hwang and Jim Stevens (8347). Using scanning tunneling microscopy to investigate the atomic structure of superlattice films, Bob and Jim determined a new mechanism for forming alloys in two dimensions. The mechanism is driven by strain relief in thin films. The work is important in the development and understanding of metallic superlattices, a novel class of thin films that are finding applications in magnetic information storage, X-ray mirrors, and special-purpose coatings.

2. Sustained Outstanding Research in Metallurgy and Ceramics: "Science of Surface Processes in Beam-Enhanced Growth." Eric Chason, Dan Buller, Jay Penn, Jerry Floro (all 1112), Jeff Tsao (1310), Kevin Horn (9351), Tom Mayer (1114), Arnold Howard (1322), Peter Bedrossian (now at Lawrence Livermore National Laboratory), David Brice (retired), and Tom Picraux (1102/1112). Through a sustained program of research, the Sandians achieved an understanding of and modeled the fundamental processes governing the atomistic evolution of semiconductor surfaces during epitaxial growth and low-energy ion bombardment. The results have had signifi-



ALLOY MAKER — Bob Hwang (8347) shines a probe onto the scanning tunneling microscope inside the vacuum chamber in his research lab at Sandia/California — equipment that he and post-doctoral researcher Jim Stevens used to make alloys by a new method. The alloys are a combination of silver with copper and cobalt. This work at Sandia/California won one of the record five Sandia 1994 DOE Basic Energy Sciences/Materials Sciences awards.

cant impact on the understanding and control of surface and interface morphology evolution during semiconductor and thin-film processing.

3. Significant Implication for DOE-Related Technologies in Metallurgy and Ceramics: "Ambient Pressure Aerogels: Thin Film and Bulk." Jeff Brinker (1846), Sai Prakash and Doug Smith (both University of New Mexico), and Raja Deshpande (Armstrong World Industries). The research team developed a novel process to prepare aerogels at ambient temperature and

pressure, in both bulk and thin-film form. The new process overcomes previous problems in making these unique and fascinating highly porous materials and could revolutionize aerogel manufacturing. Technology transfer activities are already under way.

4. Sustained Outstanding Research in Solid State Physics: "Surface Atom Energetics." Peter Feibelman (1114). Peter developed a unique computer code that led to discovery of basic phenomena in materials growth and surface chemistry. Among the new phenomena are a key mechanism in diffusion of metal atoms on metals (substitution rather than hopping), unexpected binding sites for adatoms, and mechanisms for the dissociation of molecules on surfaces.

5. Significant Implication for DOE-Related Technologies in Materials Chemistry: "Real-Time In Situ Materials Growth Monitors Using Remote Optical Probes." Kevin Killeen, Bill Breiland, Tom Kerley (all 1126), and Scott Chalmers (former postdoctoral researcher). The researchers developed two simple optical-based monitors that provide real-time in situ measurement of thin film growth during molecular beam epitaxy or chemical vapor deposition (*Lab News*, April 1, 1994). The two optical monitors provide the first direct measure of film growth and composition. Their commercialization is expected to produce efficient equipment capable of depositing precise thin-film structures of unprecedented complexity and high yield.

Sandia researchers shooting for 'smart gun'

(Continued from Page 1)

technology for smart guns, says he and the other two primary team members are trying just now to decide which "whistle" would best serve to trigger the use-control feature.

The other two are Dale Brandt (2314) and Kerry Tweet of Safety Components Dept. 2643. Dale has primary responsibility for electrical aspects of the project, and Kerry is primarily responsible for mechanical features.

National survey provided guidelines

Among the possibilities are a magnetic ring that would be recognized when the authorized user grips the gun; palm or fingerprint sensors; a sensor that would recognize the voice of the owner; or a tag worn by the owner that would transmit an electronic signal to the gun, enabling it to function.

Doug says he's now compiling smart gun technology requirements based on results of more than 300 surveys from across the US and a sprinkling from outside the country, the input of potential users.

He says it is difficult to find statistics specific to police officer shootings by assailants armed with an officer's own gun, but research back to 1979 reveals that up to 19 per year have died that way. FBI data indicate that about 16 percent of police officers killed in the line of duty are killed by an assailant using that officer's own or another officer's firearm.

This "user-recognizing-and-authorizing surety technology" — its official title — has one major central requirement, he says: "Authorized users must always be able to operate the firearm, and unauthorized users should never be able to operate it."

Must work without fail

Environment is an important facet.

"The call an officer responds to may be in a quiet swampy area or a bar with deafening music and loud people," says Doug. "The officer could be sweaty, sandy, wearing gloves, snowy, wet, or shouting. But no matter what circumstances he finds himself in, his firearm must be capable of working without fail."

Although reliability is the key feature, he says, it is not the only one.

A smart gun should not be appreciably bulkier or heavier, it should not be difficult to hold, it should not have appendages likely to

snag on clothing or other equipment, it should fit in existing holsters, and it should look like a gun.

Doug, paraphrasing one officer, says, "You can't scare a perpetrator by pointing a salami at him."

He said in a statement prepared for the US House Subcommittee on Crime and Criminal Justice recently that although the work is

focused primarily on law enforcement needs, "This project will lead to a better understanding of the general public's needs, and could lead into a dedicated effort focused on privately owned defensive weapons."

The smart gun could be the start of a new generation of firearms, he says, and continued work on the project with industry should pave the way for successful technology transfer.

Sandia and Intel scientists regain world supercomputing speed record

(Continued from Page 1)

code, set last spring, was 102 Gflops.)

Anyway you look at it, the old record has been exceeded by well over 100 Gflops.

'Very impressive numbers'

"These are very impressive numbers," says Jack Dongarra of Oak Ridge National Laboratory and the University of Tennessee. He says the work makes "a definitive claim to the 'world land speed record' for computing." Dongarra developed the original Linpack benchmark and has issued a new Linpack report confirming the Paragon system's results.

Ed Barsis, Director of Sandia's Computational/Computer Sciences & Math Center 1400, says the work is significant. "The very rapid progress in software, algorithms, and hardware development is already making realistic, three-dimensional simulations a practical tool that is beginning to impact every facet of the country's economy, defense, and well-being."

The record-busting demonstration took place at Intel's supercomputer manufacturing facility in Beaverton, Ore. The two computers were combined into one gigantic, loosely coupled system consisting of 2,256 compute nodes, each with three processors, for a total of 6,768 processors working in parallel.

Both Paragon computers ran a hybrid operating system consisting of the Paragon operating system and the Sandia-developed SUNMOS (Sandia/University of New Mexico Operating System). The two computers were coupled through 16 industry-standard high-speed parallel interface links using very high performance SUNMOS drivers to effectively interconnect each machine's mesh network.

"These results are yet another confirmation of the Paragon supercomputer's outstanding scalability," says Art Hale, Manager of Parallel Computing Science Dept. 1424. "By validating our ability to combine scalable and distributed technologies and achieve outstanding performance, it marks the transition to achievable, affordable teraflops." Teraflops refers to the goal of computing at a trillion operations per second.

Sandians on the team are all in Dept. 1424: Stephen Wheat, Rolf Riesen, Gabi Istrail, Lance Shuler, Chu Jong, and contractor Lee Ann Fisk of the University of New Mexico. They were joined by Intel scientists Jerry Bolen, Bill Dazey, Arlin Davis, Satya Gupta, Greg Henry, David Robboy, Guy Schiffler, Mack Stallcup, Amir Taraghi, and Bruce White.

The work has relevance to a variety of chal-

lenging problems that require high-level supercomputing performance: coupled oceanographic and atmospheric climate models, weapons safety simulations, design of new materials, and seismic data analysis.

"Today is a milestone for the nation's high performance computing community," Edward Masi, President of Intel's Scalable Systems Division and Vice President of Intel Corporation, says. "The Paragon system's performance shows that we're on the right track to teraflops, and highlights the breakthroughs that can result from technology collaborations between industry and the national labs."

One of the two Paragon computers used in the distributed configuration is scheduled for shipment to Oak Ridge this month upon completion of final acceptance tests. Ken Kliever, Director of Oak Ridge's Center for Computational Sciences, praises the achievement and the leadership of DOE and of DoD's Advanced Research Projects Agency in supporting high-performance computing. He says the achievement shows that scientists can now do distributed computing with powerful supercomputers — "flexibly and easily couple large systems at different sites. . . and thereby solve problems that are beyond the scope of a single machine."

Sandia and Oak Ridge are making plans to remotely link their two Paragon systems for use as a distributed "meta-computer."

Welcome

Albuquerque — John Kirby (7400)

Other New Mexico — Teresa Bottomly (9426), Kurt Larson (6347), Christine Northrop-Salazar (6700), Patsy Perschbacher (10504)

Arizona — John Alfonso (12820)

Colorado — Laura Patrizi (9426)

Illinois — Daniel Savignon (2314), Mazen Tabbara (1518)

BES awards

(Continued from preceding page)

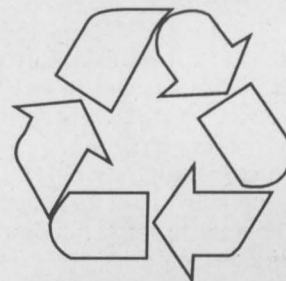
with five of them. Four of the teams are at Sandia/New Mexico and one is at Sandia/California. The research was performed within five Sandia technical centers (Physical and Chemical Sciences Center 1100, Microelectronics and Photonics Center 1300, Materials and Process Sciences Center 1800, Center for Combustion/Materials Science/Technology 8300, and Applied Physics, Engineering, and Testing Center 9300), and one of the awards involved a collaboration with the University of New Mexico and Armstrong World Industries, Inc.

George notes that it has been DOE's custom to provide capital equipment money with each award, and he expects that to be the case this year as well.

He adds: "It is especially satisfying to note that our awards were determined by the votes of our competitors — the other labs."

An awards ceremony is being planned.

This newspaper is printed on recycled paper.



DO IT AGAIN!
This newspaper can be recycled with regular Sandia office paper.

Royalties

(Continued from Page 1)

Sandia divisions, departments, inventors, authors, and employees who help in developing the new technology share in royalties that Sandia receives from licensing patented and copyrighted intellectual property. The royalties come to Sandia from companies whose products use Sandia-licensed innovations.

Vic says \$106,000 in royalty payments was distributed during the December ceremony, compared with \$46,000 last year at the same time. (He expects next year's amount to reach close to \$250,000.) For a given royalty payment, the inventors listed on the patent (or authors listed on the copyright) share 20 percent, their divisions get 50 percent, and their departments get 20 percent. The remainder is set aside to recognize important contributors not listed on the patent applications.

Money awarded to inventors is considered an incentive for all Sandia scientists and engineers to patent their inventions and then work to bring them closer to commercial fruition. The money to the administrative units helps fund future research.

It's all part of a Sandia effort to expand and accelerate the patent and licensing process, recognize and capitalize on the value of Sandia intellectual property, and use the increased royalties to provide an alternative way to fund future R&D.

"We want all Sandians to look at what they can do, within our program parameters, that can also make their inventions commercially attractive while still meeting all program requirements," says Vic.



ROYALTY AWARDS — Three of the 46 Sandians honored at the royalty awards ceremony receive their recognition from Sandia President Al Narath (second from right). They are Archie Farnsworth (left), Gerald Kerley (third from left), and Paul Taylor (right, all 1432). Helping bestow the honors are VP Paul Robinson (4000, second from left) and Executive VP Jim Tegnalia (center). The three were among 10 Sandians recognized that evening who developed the CTH computer code, now licensed to more than 150 companies, universities, and government organizations for modeling a wide range of high-energy, high-velocity phenomena. Twelve other Sandia groups were also honored at the Dec. 9 event.

Learn how you can participate

Sandians who are interested in technology transfer and the process for patenting and licensing inventions and copyrights are invited to the Technology Transfer Center (Bldg. 825) on Friday morning, Jan. 27.

The program, sponsored by Technology Transfer & Commercialization Center 4200, will have presentations and information booths where you can meet the Product

Area Manager for your technical area.

"Here's a chance to come learn about all the possibilities of tech transfer, from CRADAs and user facilities to participation in the patent and licensing program, and how you might be able to reap further benefits from your work," says Vic Chavez (4203). For further information call him on 271-7828.

Thirteen Sandia technologies in new commercial products

Over the past year, Sandia issued licenses for 13 new products that cover a wide range of technologies, from computer software to a device for sorting recycled plastics to a low-energy electronic igniter that allows the use of multiple air bags in automobiles. Here are the inventions and their Sandia inventors recognized at the Dec. 9 royalty awards program.

(Their current organizations are listed; these may differ in some cases from the organizations where the work was originally carried out.)

Precision Wire Feeder for Small-Diameter Wire. This device feeds small-diameter hard and soft wires in sizes and speeds not previously possible. The smallest diameter wire that known commercial wire feeders handle is 23 mil (thousandths of an inch). This device feeds 5- and 10-mil wires at speeds up to 400 inches per minute, and laser-beam welds have been made at that speed. *Inventors: Eldon Brandon, Fred Hooper (both 2484), and Marvin Reichenbach (deceased).*

Device for Sorting Plastics. Developed to automate the classification of plastic waste into one of seven categories designated as recyclable by the Society for Plastic Industries. Near-infrared light is used to differentiate one plastic from another using the vibrational characteristics unique to each. The device can classify many types of plastics with a success rate of 98 to 100 percent. *Inventors: Kathleen Alam (1823), Suzanne Stanton (2338), and Gregory Hebner (1128).*

Semiconductor Bridge (SCB) Igniter. A device that is especially useful for insensitive high explosives and pyrotechnics. It can be actuated by very low energy current pulses, and yet achieve adequately high and safe no-fire levels. The components can be integrated with other components of the explosive system. The SCB makes multiple air-bag and restraint systems in automobiles more feasible because it requires much less energy than traditional hot-wire igniters. *Inventors: Robert Bickes Jr. (2653) and Alfred Schwarz (retired).*

Tungsten Bridge for the Low-Energy Ignition of Explosive and Energetic Materials. The device exhibits substantially shorter ignition times than standard metal bridges and foil-igniting devices. Also, it requires much less energy to cause ignition than do common metal bridges and foil devices. *Inventors: David Benson (1333), Robert Bickes Jr. (2653), and Robert Blewer (1305).*

Motor-Driven Clamp Mechanism for a Borehole Seismic Receiver. The receiver consists of a sensor package and a motor-driven mechanism for clamping the package to a borehole. The sensor package is intrinsic to the clamp arm; in current designs, a separate clamp arm locks the package into the borehole. Electrical connections may be made at both ends to permit multiple receivers to be connected in an array. Operating temperatures up to 200 degrees C are possible. *Inventors: Bruce Engler (6114) and Gerard Sleepe (9136).*

CLERVER: Method & Apparatus for Collaborative Use of Application Program. CLERVER allows multiplexing of unaltered X-windows based application software so two or more users can simultaneously interact with the commercial applications. *Authors: Craig Dean (9403), Eric Brock (9426), and Han Wei Lin (13212).*

FLOW. FLOW software graphically displays temperature data derived from an In-Situ Permeable Flow Sensor, inverting the temperature data to determine the groundwater flow parameters that best fit the data. *Author: Sanford Ballard (6116).*

SWORD. This software controls instrumentation and may be used to characterize and benchmark the reliability and quality of integrated circuits. SWORD consists of about 10,000 lines of BASIC code. The software is divided into a series of subroutines that have accompanying documentation describing their use and application. *Authors: Eric Snyder, William Miller, Donald Pierce, Scot Swanson, and Norman Smith (all 2276).*

GISC (Generic Intelligent System Controller). The GISC is an intelligent controller used in operating multiple and cooperating robotics systems and intelligent subsystems in an unstructured

environment. It provides ease of operator use, enhanced safety, and improved system performance. *Authors: Raymond Harrigan (2102), Michael Griesmeyer, William Davidson, and Peter Boissiere (all 2161), Robert Palmquist and David Miller (2151), and William Drotning (2171).*

PROMPT. Like its predecessor, SANDROS, this is a path planner for robot controllers that often operate in cluttered environments. PROMPT was designed to allow a fast computation of a robotic system manipulator's movement to avoid collisions with other objects. PROMPT is capable of planning for six-degrees-of-freedom robots, which are the most common robotic systems, in less than 10 minutes for most realistic robotic functions, a vast improvement over existing technology. *Author: Pang-Chieh Chen (2121).*

SANDIA.LIB. This is a library of parameter sets and macromodels of semiconductor devices. They are used with simulators that use SPICE, a program for electronic circuit analysis, and simulate electronic circuits. *Authors: Michael Deveney (2252), Christopher Helms (2231), Carolyn Raney (2252), Donald Pierce (2276), and Alan Asselmeier (retired).*

CTH. This is a family of codes for modeling material response in complex multidimensional, multimaterial problems characterized by large deformations or strong shocks. Models have been included for material strength, fracture, distended materials, and high explosive detonation. *Authors: Eugene Hertel and Michael McGlaun (both 1431), A.V. Farnsworth Jr., Gerald Kerley, Stewart Silling, and Paul Taylor (all 1432), Stephen Rottler (1511), Lane Yarrington (6312), Debra Campbell (9432), and Samuel Thompson (deceased).*

SMART (Sandia's Modular Architecture for Robotics and Tele-operation). This software system is designed to integrate the different robots, input devices, sensors and dynamic elements required for advanced models of telerobotic control. *Authors: Robert Anderson (2151), and William Davidson and Peter Boissiere (both 2161).*

Sandia launches agile and advanced manufacturing Internet site

On Dec. 19, Sandia launched the Agile and Advanced Manufacturing Web on the World Wide Web (WWW) Internet site. This site provides a single point of access for Internet users to reach information regarding advanced manufacturing from a wide range of industry, government, and academic locations. It also offers a forum for publishing new developments via the Internet. Entities now participating include Honeywell, General Electric, Lockheed, National Institute of Standards and Technology (NIST), University of California at Berkeley, Georgia Tech, and others.

The Agile and Advanced Manufacturing Web site was organized and developed by Sandia's A-Primed (Agile Product Realization for Innovative Electro Mechanical Devices) project. The Sandians noted that Internet offered tremendous potential but was underutilized because there were few mechanisms to allow users to locate and retrieve the information they needed easily and quickly.

"The goal of the web site was to create a desktop tool with which project team members could more effectively interface with the Internet," says Chris Forsythe (12323), one of the web's developers. "The site also serves as a beginning point for development of virtual corporations by creating an electronic environment that fosters collaboration between experts at geographically dispersed sites."

After the web had been in service for just two days, Chris said he had already found himself in the midst of "a very productive dialogue" with a previously unknown counterpart at NIST, regarding product data management.

The Agile and Advanced Manufacturing Web was the creation of Sandians Rodema Ashby (2122), Chris, and Julie Ratner (12323). They say the web site may be accessed through Tie-In at the URL address:

http://www.sandia.gov/agil/home_page.html. For further information contact Chris on 844-5720.

Sandia in the News

This is a periodic column listing a selection of recent print and broadcast news reports about Sandia. It is provided by Media Relations Dept. 12621 to give Sandians a sense of what is being said about Labs work in national and international media.

A *Providence (R.I.) Bulletin* news feature about new technologies needed to develop a "SuperCar" covers work by Pete Witze (8362), including his equipment that allows direct observation of what takes place within the cylinder of an engine and work he's doing with General Motors, Texaco, and other companies.

The national magazine *Science News* carried a lengthy piece, with art, about how Jacqueline Chen (8351) is using Combustion Research Facility computers as microscopes to zoom in on complex interactions as a way to better understand "the fundamental interactions between fluid mechanics and chemistry in turbulent combustion."

Tass, the official Russian government news agency, reported that "from now on, Russian and American nuclear specialists are going to work together to improve monitoring, control, and security systems for nuclear materials." The report identified Sandia as one of the participating agencies. *BBC World Service* also picked up the story.

The Scientist's lengthy survey about technology transfer at the national labs mentioned Sandia computer scientists' work with New York-based Citibank Corp. to reduce bank fraud.

A *Government Computer News* story about advances in virtual reality technology and practical applications devoted significant space to Sandia's Multidimensional User-oriented Synthetic Environment (*Lab News*, May 13, 1994) and offers extensive quotes from Creve Maples (1415). Creve pointed out in the article that virtual reality is all about expanding mental skills; however, he added, "It doesn't matter if I can compute in five seconds what used to take an hour, if my brain can't correlate the data easily."

Sandia's first annual "Network Day," held in Santa Clara, Calif., drew a media crowd. Those covering the event, which included a display of Sandia's mini steam engine: KNTV-TV and KICU-TV, San Jose; KDTV-TV, San Francisco; the *San Jose Mercury News*; and KQED, San Francisco's National Public Radio affiliate.

The national newspaper *Investor's Business Daily* featured a photo and description of Sandia's mini steam engine in an article about "mind-boggling" computer technology "straight from a sci-fi novel."

Paul McWhorter (1325), instrumental in developing the mini steam engine, appeared as an in-studio guest on KPIX-TV's morning news show, out of San Francisco.

Sandia robot expert Paul Klarer (9616) was quoted in several places in the *Pittsburgh Post-Gazette's* page-long feature about the Dante II robot, which explored the interior of Alaska's volcanic Mount Spurr.



BIG 3 AUTOMAKERS VISIT — Bruce Kelley (1833, far right) demonstrates an induction hardening process in Area 3 to members of the Partnership for Next Generation Vehicle (PNGV) Technical Task Force. The PNGV is an industry-government-national labs partnership to develop technologies for the next generation of automobiles (*Lab News*, Dec. 2). The PNGV technical task group, which includes research officials of the Big 3 U.S. automobile companies — General Motors, Ford, and Chrysler — visited Sandia Dec. 7 for a day of tours and briefings. VP John Crawford (8000, second from left) gave the overview presentation on Sandia transportation and automotive programs. Others prominently seen here include (from left), Al Sylwester (6203), Crawford, Jerry Walker of the National Aeronautics and Space Administration, Alan Wolsky of Argonne National Laboratory, Bob Mull of Ford Motor Co., Task Force Chairman Rob Chapman of the Department of Commerce, Chris Sloane of General Motors Corp., and (leaning in, near bottom) Pandit Patil of DOE. There were also briefings on advanced manufacturing technology, automotive materials projects, computational research for automotive applications, energy storage, and auto combustion and emissions programs. The same group visited Los Alamos National Laboratory Dec. 6. On Dec. 5 members of the Clean Car Coordinating Committee, an interlabs cooperative chaired by John Crawford that coordinates work of the DOE labs in supporting the PNGV, met at Sandia. The PNGV group will visit Sandia/California on Jan. 18.

! Take Note

Retiring and not seen in *Lab News* pictures: Hugh Bivens (2254), 37 years; C.A. Davidson (2741), 41 years; John Keizur (4114), 34 years; Josephine Sandoval (12111), 31 years; John Walter (4212), 25 years; Phillip Wehrman (9312), 30 years.

The Albuquerque branch of the American Cancer Society will host a New Orleans-style masked costume ball in celebration of Mardi Gras on January 28 at the Ramada Hotel Classic 6-10 p.m. Cajun cuisine and the jazz sounds of Dave &

Friends will be featured. Proceeds will fund public education programs, support services, and cancer research. Tickets for the event, which will be emceed by local media personalities Deanna Saucedo and T.J. Trout, are \$30 each or \$50 per couple. Call the American Cancer Society on 262-2333 for more information.

The City of Albuquerque has an Orange Barrel Hot Line. If you wish to report problems concerning barricades and orange barrels on Albuquerque city streets, call the hot line on 768-2553.

Retiree deaths

Bobby Schmedeman (65)..5216Nov. 10
 Anthony Repetti (83)2355Nov. 14
 Albert Schmedler (70)7213Nov. 16
 Ernest Fuentes (74).....2551Nov. 18
 Frutoso Gurule (70).....7814Nov. 19
 Dorothy Fones (83)8275Nov. 25
 James Hay (87).....8296Nov. 26
 Norman Nichols (90)7613Nov. 30

Sandia News Briefs

Reengineering plays to packed houses; questions to be answered in Lab News

Both sessions of the reengineering "town meetings" at the Technology Transfer Center on Dec. 13 were packed, and the *Lab News* is working with the reengineering staff to consolidate questions posed by employees, answer them, and publish responses. The questions answered will include those posed at the Dec. 12 reengineering meeting at the BDM Building. Basic information and some questions/answers about the Labs' reengineering efforts were published in the Dec. 2 *Lab News* after the initial town meeting at Sandia/California. Look for the next installment of questions and answers in our next issue. If you couldn't attend the meetings or if you have additional questions, tag them "reengineering questions" and fax them to 844-9074. We'll publish all responses as soon as possible.

SCFO Controller Center employee recognition program

A team of Sandians in CFO Controller Center 10500 is giving kudos to other employees in the center for doing exceptional work. Employees, team members, or managers nominate fellow workers or teams to receive cash awards for exceptional administrative, technical, or operational service in support of the center mission. Award recipients to date include Sophia Garcia (10500), Marjorie Kinkel (10501), Debbie Rider (10501), Sandra Seymour (10501), Joanie Pettiford (10503), Michelle Paton (10504), and Robbie Evanoff (10505). The employee recognition team has volunteered to help other Sandia organizations get similar programs working; call Joyce Sartain (10504) on 844-2449 or Don Flores (10505) on 845-9274 for information.

President declares January National Blood Donor Month

Continuing a 10-year tradition, President Clinton has declared January National Blood Donor Month. In a recent thank-you letter to Sandian blood donors, United Blood Services community relations representative Gretchen Cody said, "In a world where we tend to forget the value of the individual, there is no substitute for the human blood you donate. All of those who live today because of your anonymous gift of life would probably like to thank you . . . they just don't know your names." Blood collection facilities and times are announced regularly in the *Sandia Weekly Bulletin*. Sandia/New Mexico's blood drive coordinator Linda Stefoin (3344) says New Mexico employees donated 915 pints of blood in 1994. Sandia/California blood drive coordinator Dottie Wiemken (8522) says California employees donated 264 pints last year.

DOE gives industrial competitiveness award to Sandia

Sandia has received DOE's 1994 Industrial Competitiveness Business Line Customer Service Award. The award was presented to the Labs for reducing CRADA (cooperative research and development agreement) processing time by more than 60 percent. The Sandia process management team that worked to achieve this reduction includes Mary Monson (leader) and Donna Rix (both 4202), Marlene Keller (10404), Carol Sumpter (11510), Don Rohr (1301), Angelo Salamone and Mark Allen (both 4211), and Susan Clair, Carol Evans, and Linda Blevins (contractors). The award was presented by DOE's office of the Deputy Under Secretary for Technology Partnerships and Economic Competitiveness.

Sandians leading group reviewing education standards

Richard Nygren (6531) and Ken Eckelmeyer (3615) are leading a group of educators reviewing science education standards that may be applied at the University of New Mexico. Recommended by the National Research Council (NRC), the standards are intended to improve the university curriculum for training educators who will teach science and math in kindergarten through grade 12. Faculty from various UNM science departments and the math department are also serving on the review group along with teachers from Albuquerque Public Schools. A report of the group's recommendations is currently being written. Ken is also working with NRC and professional societies to organize a national effort of technical professionals committed to helping implement the NRC standards in their communities' schools.

Electronics reliability team to receive tech transfer award

Five Sandians have been selected to receive a 1995 Award for Excellence in Technology Transfer from the Federal Laboratory Consortium (FLC). Eric Snyder, William Filter (both 2276), Ed Cole, Chris Henderson (both 2275), and Jim Sweet (1333), will receive the award in April at the FLC National Technology Transfer meeting in Atlanta. The team is receiving the award for "a cooperative transfer of an advanced suite of techniques for improving the quality and reliability of microelectronics to a broad base of US integrated circuit manufacturers." The FLC awards recognize federal lab employees who have done an outstanding job of transferring technology to government and private-sector users.

Send potential Sandia News Briefs to Lab News, Dept. 12622, MS 0413, fax 844-0645.

Recent Patents

Kenneth Condreva (8416): High Resolution Time Interval Counter.

Jim Pierce (6642): Crash Resistant Container. Mary Alam, David Haaland (both 1823), Edward Thomas (12323), and Mark Ries Robinson (non-Sandian): Reliable Non-Invasive Measurement of Blood Gases.

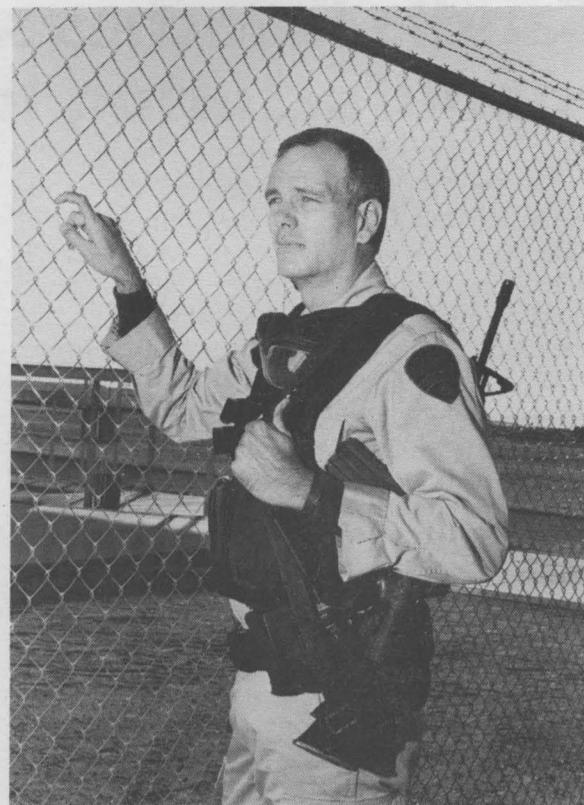
Vincent Hietala (1322), Gert Hohenwarter, and Jon Martens (both non-Sandians): Reflective HTS Switch.

Carol Ashby (1311) and David Ginley (non-

Sandian): Process for Etching Mixed Metal Oxides.

Richard Schneider (1311) and James Lott (non-Sandian): Electrically Injected Visible Vertical Cavity Surface Emitting Laser Diodes.

Vincent Hietala, Thomas Plut, Chris Tigges, Gregory Vawter, Thomas Zipperian (all 1322), David Ginley, and Gert Hohenwarter (both non-Sandians): High Temperature Superconductor Step-Edge Josephson Junctions Using Ti-Ca-Ba-Cu-O.



SECURITY POLICE OFFICER OF THE YEAR — Steven Moodie (7435) was recently selected as Security Police Officer of the Year for 1994. Steven, a member of the Special Response Team in Area 5, was selected from a group of officers previously selected as Security Police Officer of the Quarter. His selection was based on pre-established criteria in leadership, work habits, job knowledge, and consistency in upholding corporate values.

(Photo by Randy Montoya)



SANDIA RESEARCHER HONORED BY ENGINEERS — Daniel Segalman, Structural Dynamics Dept. 1434, was recently named a Fellow of the American Society of Mechanical Engineers (ASME). The Fellow grade is conferred upon a member of ASME with at least 10 years active engineering practice who has made significant contributions to the field. During a career spanning more than 15 years in industry and national laboratories, Daniel has worked in the areas of structural dynamics, smart materials, and mechanics of rotating systems. He holds four US patents. The 125,000-member ASME is a worldwide engineering society focused on technical, educational, and research issues. It conducts one of the world's largest technical publishing operations, holds some 30 technical conferences and 200 professional development courses each year, and sets many industrial and manufacturing standards.

Sandians introduced to Labs' biomedical projects

The surgical room of the future, a new laser treatment for enlarged prostate glands, and enhanced magnetic resonance imaging were among the topics discussed at Biomedical Engineering Day Dec. 12 at the Technology Transfer Center.

The purpose was to introduce Sandians to some of the Labs' biomedical projects and to discuss the strategy for the program, which is directed by Sam Varnado, Director of Information Systems Engineering Center 9400. The biomedical program is based on the assertion that properly applied technology can reduce health care costs through earlier diagnoses, reduced hospital stays, and minimally invasive therapies.

Sandia's program focuses on identifying the Labs' existing and emerging technologies that can be applied within the biomedical industry and teaming with industry and academic institutions to help solve some of their problems. "We're not really straying off the branch with this program," Sam told Sandians. "We're applying technology we know to the biomedical area."

One of the program's early successes was the development of a technology for non-invasively measuring blood glucose levels, which is based on a technology originally developed to monitor aging nuclear

weapons. The technology has since been licensed to an Albuquerque company, which

is working to refine it into a marketable product. — Julie Clausen (12621)



BIOMEDICAL DAY — Bill Kass (left) of Optoelectronic Applications Dept. 2235 discusses a laser treatment being developed for benign prostatic hyperplasia with Sam Varnado (9400, center) and Dr. Steve Dawson of Massachusetts General Hospital (right). At Sandia's Biomedical Engineering Day, Dawson presented his ideas on the future of surgery.

Sandia, Disney forge fiery R&D alliance

\$300,000 CRADA to enhance pyrotechnics at theme parks

Even the sorcerer's apprentice, Mickey Mouse, needs a little help making magic sometimes. So when engineers from the Walt Disney Company decided they needed a more versatile device for igniting fireworks at Disney theme parks, they sought the assistance of Sandia researchers.

Sandia's assistance has taken the form of a new cooperative research and development agreement (CRADA) between Sandia and Buena Vista Pictures Distribution, Inc., a wholly owned subsidiary of Walt Disney, that will enhance Disney's fireworks displays by improving ignition capabilities. Chemical time delay fuses are currently used to ignite Disney's pyrotechnics. With Sandia's help, Buena Vista engineers will work to develop an improved electronic ignition system based on a semiconductor bridge (SCB) to ignite the displays. The semiconductor bridge igniter is a special integrated circuit developed by Sandia several years ago to trigger explosive releases with more precise control.

'A groundbreaker for future CRADAs'

But improving fireworks displays is not the only project that Sandia and Disney plan to work on together, says Pace VanDevender, Director of Sandia's National Industrial Alliance Center 4700. Future Sandia/Disney collaborations could include noise and vibration control, intelligent vehicles, "smart" materials applications, and information systems technologies projects.

"This is a good start in a relationship that will combine Buena Vista's strength in entertainment with Sandia's in science-based engineering," Pace says.

Dennis Mitchell (2607), the Sandia project manager for the semiconductor bridge igniter CRADA, emphasizes the importance of this pilot project in paving the way for future projects.

"While the initial CRADA is a relatively small project in dollars, it is significant in that both Sandia and Disney officials consider it a groundbreaker for future CRADAs," Dennis says.

Richard Wiedenbeck, a Buena Vista vice president agrees, and he notes that this and any future CRADAs will meld the talents of two institutions known for their creativity.

"We at Disney are storytellers, and we expect this cooperative relationship may even-

tually allow us to tell another story by showcasing the positive things that the national laboratories are doing to help all Americans," Wiedenbeck says.

— Ace Etheridge (12621) and Mary Hatheway (12622)

SCB technology transferred to industry

The semiconductor bridge igniter being modified for Walt Disney was developed and tested by scientists in Sandia's Explosive Components Dept. 2653. Bob Bickes, who perfected the SCB in 1986, is one of 46 Sandians receiving recognition through Sandia's technology licensing program for inventing a product that has helped industry (see story on page 4).

The semiconductor bridge is a silicon chip mounted on a sapphire or silicon substrate. The chip, which is doped with diffused phosphorous, forms the "bridge" that allows electrical contact with an overlaid aluminum land. Once an electrical pulse is applied across the SCB, the chip heats up and explodes within a few tens of microseconds.

The semiconductor bridge was designed to replace the small metal hot wires conventionally used to electrically ignite small

explosive charges. There are many advantages of using the SCB to ignite explosives. The SCB has about a hundredth the volume of a hot wire and is 1,000 times faster. It also needs only about one-tenth the amount of energy for ignition that a hot wire needs but can withstand twice the amount of current as hot wires without igniting accidentally. Unlike a hot wire, the SCB cannot short-circuit or pick up static electricity, nor does it require long wiring harnesses and mechanical connectors. Finally, the reliability of the SCB is superior to that of the hot wire.

Originally designed for defense and military purposes, the SCB igniter has many other potential industrial applications, including restraint systems and multiple air bags in automobiles, time-arrayed blasting for mining, and testing the structural soundness of arches in mine tunnels.

! Take Note

A program to inform all first-time New Mexico drivers of the seriousness of New Mexico's DWI (driving while impaired) problem is now required by state law before a New Mexico drivers license will be issued. Effective July 1, 1994, anyone who is 18 years of age and older who wants a drivers license, including those who haven't had a license before and all new residents of New Mexico, is required to take a three-hour DWI education course titled "None for the Road." The Traffic Safety Bureau-sanctioned

course is offered only by Pueblo Alegre Educational Services, Inc. The course is offered throughout the state at various locations at a cost of \$16 per person. (For questions about requirements for individuals under the age of 18, please call your local Motor Vehicle Division office. This program does not meet licensing requirements for individuals under the age of 18.) For information about classes and locations, contact Pueblo Alegre in Albuquerque on 821-5755; all other areas, call 1-800-621-5755.

Feedback

Continuing education declining?

Q: I have been at Sandia for 20 years and am disappointed to see a slow decline in the emphasis placed on continuing education over that time. A few examples: We no longer have in-hours or out-of-hours classes; Sandia no longer pays for technical textbooks (the cost of which is just a drop in the bucket for Sandia, but which can be very expensive to the individual); and now Martin Marietta has decreased the number of hours per week allowed for education from 7.5 (per SLI 4555) to less than four, thereby requiring a deviated work schedule to take a class at UNM.

Although career development is now an official company goal, the tools to accomplish this are disappearing. Comments please.

A: Overall, Sandia continues to fund Continuing Education, even though the emphasis may not be readily apparent. In fact, a specific training and education policy statement was reviewed by the Sandia Quality Leadership Council in late November.

In-hours Technical Education Courses (INTEC) continue to be offered. The current program offers courses in the areas of weapons, project management, concurrent engineering, quality, and the distance learning program.

Courses formerly offered in the Out-of-Hours program are now offered through Albuquerque T-VI. We found we were duplicating many courses provided by T-VI. By directing our students to T-VI, we were able to free the Training and Development staff to provide more internal services and eliminate redundancy and duplicate spending.

Textbooks are very expensive not only for individual employees, but also for Sandia. (We found that textbook purchasing consumed a substantial amount of the Training and Education budget with minimal use of the books by students.) Therefore, we have asked that line organizations share this burden by assuming the cost of books while the Tuition Assistance Program (Education and Training) pays tuition.

The change in the SLP was not a Martin Marietta initiative, but was done at the request

of DOE and incorporated into Appendix A of the Martin Marietta/DOE contract. When we looked at the data with respect to granted time off, Sandians were not coming close to 7.5 hours, and four seemed more than adequate. Appendix A does provide for an exception should the student's schedule require granted time off over and above the four hours. The request for exception must be signed by the VP of Human Resources.

Career development for Sandians plays an important role in our future, and the tools for career development continue to exist. Budget and staff adjustments are made to eliminate redundancy between Sandia and our university colleagues. We continue to see increased tuition costs as well as increases in the number of Sandians participating in Continuing Education programs. Our student enrollment and budget allocation for FY95 have increased, which translates into a major impact on budget dollars provided by Sandia for education and training.

It has been our goal to try to make the best, most cost-effective decision for Sandia employees and DOE.

Marv Torneby (3500, recently retired)

Medical plan with incentives?

Q: I am sure that you get more advice than you need from non-medical persons such as myself, but I found a Reader's Digest article very interesting, and felt the rationale could have some application to Sandia and our self-insured medical plan.

Obviously, Reader's Digest is not a professional journal, but the article tells, in very simple and understandable terms, about some other companies that greatly improved their medical claims records by creating an incentive plan for their employees. The simple plan offers a bonus for employees who are able to keep their medical costs low, while not penalizing employees who require the full benefits. It seems this is a win-win situation for the employees and the company. My only comment is that I believe the amount of the incentive needs to vary, depending on whether it is for a single employee or for a family plan.

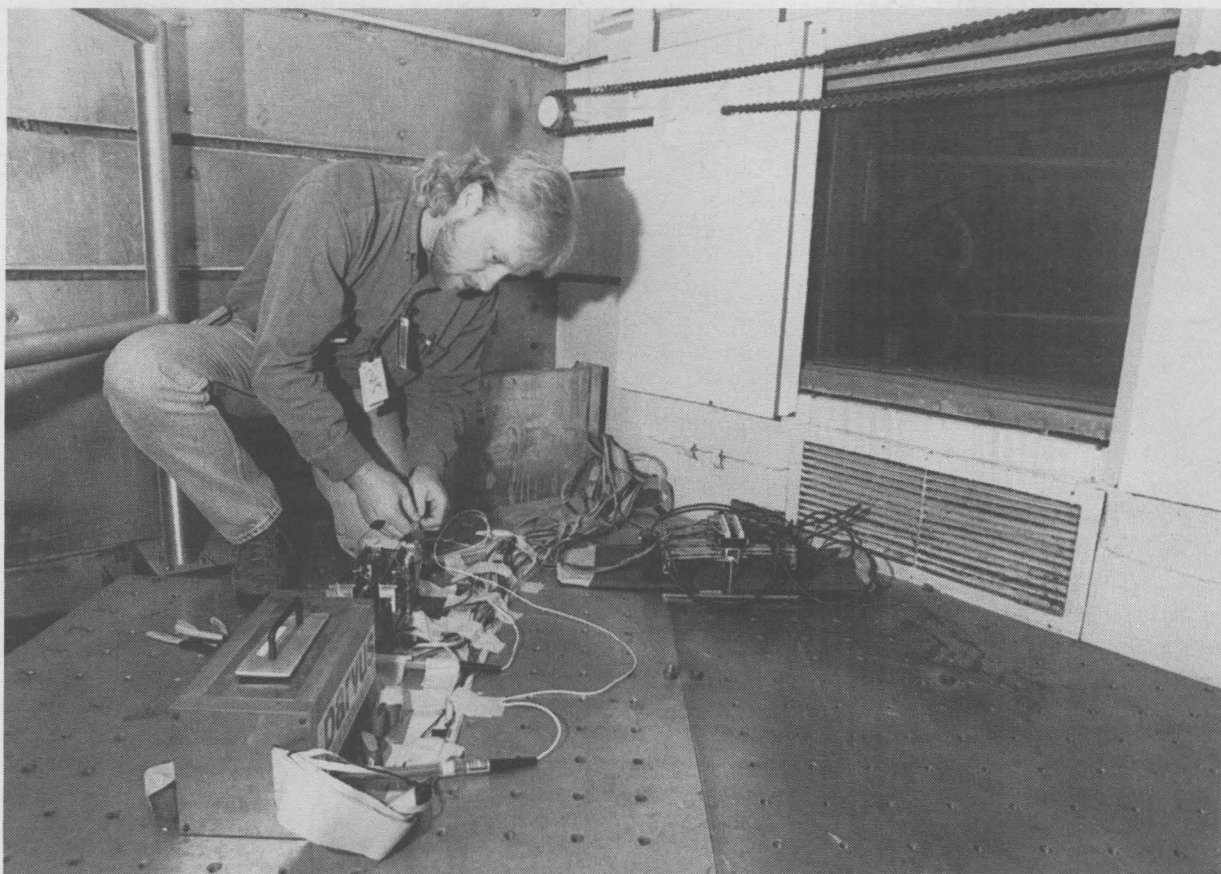
I'm curious as to how you feel about this article and such incentives. It seems to be a creative and advanced approach to the ever-increasing problem of rising medical costs.

A: Thank you for the article. It is an interesting concept and could possibly reduce cost for certain companies. A preliminary analysis of providing an incentive to non users seems to indicate it would increase Sandia's cost, but Benefits has asked its consultant for additional information about these types of programs. Also, under terms of Sandia's prime contract, DOE would have to approve any major plan changes, and would be unlikely to approve this type of change unless a substantial cost savings were anticipated.

Although Sandia's health care costs increase every year, the inflation we are experiencing is somewhat lower than the inflation many other plans are experiencing. Several programs that have been implemented over the last several years account for the decrease in the rate of increase in Sandia's health-care cost. The Medical Department introduced the Total Life Concept (TLC) program in 1986, and in 1989 the Health\$mart program became part of the Sandia Medical Care Plan (MCP). These programs helped employees take more responsibility for their overall health and health-care choices.

In October 1992, a network of mental health and chemical-dependency providers were asked to join a network that would service Sandians. Providers agreed to accept fees that were 50-80 percent of their usual fees. In April 1993, the prescription drug program that included negotiated fees at local pharmacies and a mail order option was implemented. In July 1993, all the local hospitals began providing Sandians a discount. Most recently, the two large X-ray providers in Albuquerque have agreed to a discount fee. Sandia will continue to request discounts from local providers and encourage employees to seek care from the providers that provide quality care for appropriate fees.

Ralph Bonner (10500, formerly 3500)



HOT ROBOT — Trent Foster, an engineer with the Parvus Corporation, works on a robot manipulator inside a hot cell at Sandia's North Gamma Irradiation Facility (GIF). As part of a DOE contract, Parvus researchers recently spent two months at Sandia testing the viability of a control system for robot manipulators incorporating microprocessors and control electronics in a high-radiation environment. According to Foster, empirical testing at the GIF has been crucial in reducing development time and cost in meeting the operational goals established by the DOE contractor. Parvus officials say that the company's control system is unique because it is the first to use microelectronics instead of festooned cabling, which has a limited range of operation, to control robot manipulators in irradiated environments.

Feedback basics: Here's how the system works

Sandians are encouraged to submit questions or suggestions about Sandia through the Feedback system for responses by managers or other appropriate employees.

You will receive a personal response if you provide your name and address with your Feedback question or response.

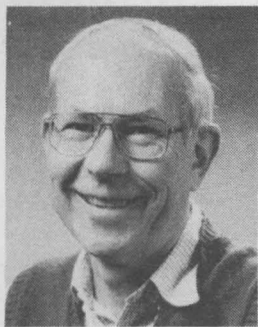
Some, but not all, Feedback submissions and responses are published in the *Lab News*. We never publish the name of the person submitting the original question/suggestion, but we do publish the name of the person responding. Only those Feedbacks judged to be of interest to the Labs' general population are selected for publication. In other words, you are guaranteed a response only if you submit your name and address with your Feedback. We preserve your anonymity both in and out of print if that is your wish. Simply indicate that you do not want your name associated with your question/suggestion when you send it to us, and the Feedback coordinator will honor that request. When the response is returned to us, we will return it to you, at your home address if you desire.

Special Feedback forms are available, along with additional information about how the system works, by calling Janet Carpenter (12622) on 844-7841. However, it is not necessary to submit your question/suggestion on a form. Employees may mail Feedbacks to the Feedback coordinator at MS 0413, or — if complete anonymity is not important to you — fax them to us on 844-0645.

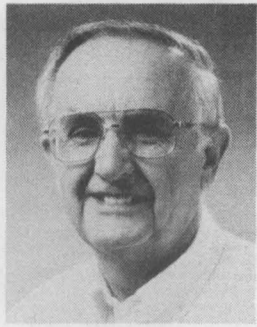
Recent Retirees



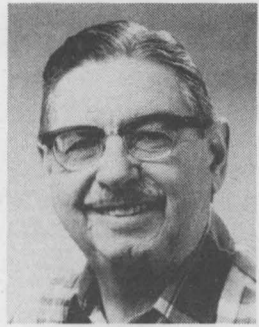
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Ed Clark 28
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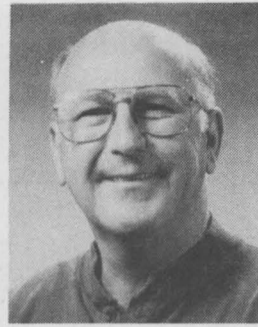
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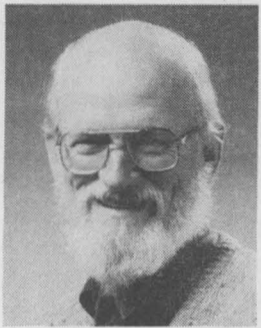
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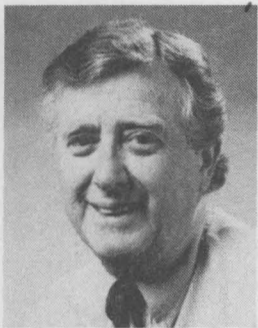
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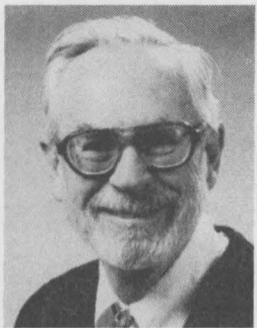
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Lew Suber 33
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Fred Gunckel 27
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Charlie Arnold 27
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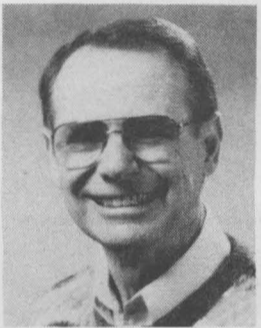
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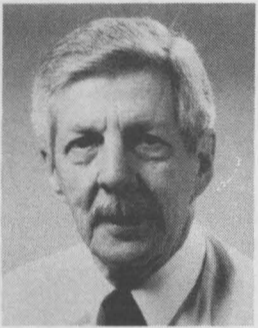
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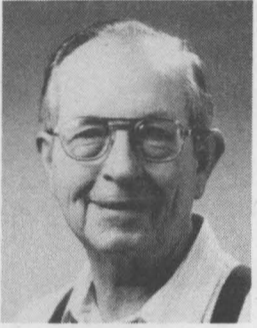
Ruth Tucker 10
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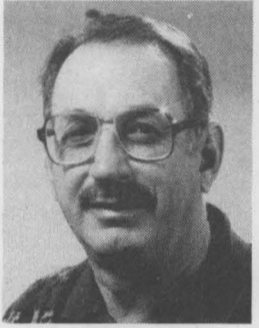
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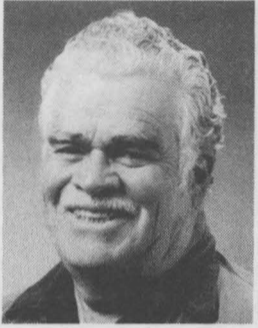
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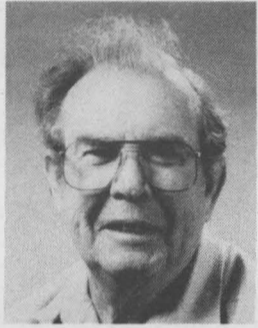
Mel Brock 41
12365



Ken Grant 31
7911



Abie Ortiz 24
7814



Cecil Morrisett 35
7906

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

CAROUSEL SLIDE TRAYS, 7 of 140 capacity, \$5 ea., 27 of 80 capacity, \$3 ea., or take all 34 for \$85. Caskey, 294-3218.

FREE AKITA MIX DOG, 5-month-old female, has all shots, really smart, friendly, good watch dog. Etheridge, 888-2633.

CHILD'S ROLLER SKATES, leather, sizes 2, 3, 4, 5, \$30 ea.; Strolee toddler car seat, \$10; antique sewing table, \$40. Sweeney, 247-4866.

MUSIC MAESTRO BOARD GAME, by Aristoplay, preschool to adult, complete w/tape, \$10; satin clown doll w/porcelain face. Wagner, 823-9323.

NYLON PLUSH PILE CARPETING, 17 yards, high quality, mauve, w/pad, used 1-1/2 years, cost \$45, asking \$6/yard. Hernandez, 299-5749.

THREE-IN-ONE TABLE, bumper pool, poker, dining room, oak, \$475. Kolb, 299-3403.

GOLDEN RETRIEVER/CHOW MIX, free to good home, 3 years old, good w/children, very affectionate. Garrity, 275-3044.

PEKINGESE PUPPIES, will be weaning age by Dec. 24. Fulmer, 265-9192.

KING-SIZE WATERBED, four poster, rosewood finish, complete w/frame, heater, mattress, good condition, \$200 OBO. Clise, 271-2865.

SLEEPER COUCH, recliner rocker, Ottoman, excellent condition, \$500; 9 ft. x 12 ft. wool rug, \$200; exercise bike; rower. Skinner, 856-1563.

CRIB MATTRESS, good condition, \$10. Palmquist, 281-5951.

GNOMES, Hattie, Mable, Rosemary and Sol, make offer. Maestas-Blemel, 281-8697.

SKI RACKS, Barrecrifter, 6 pair, locking, roof-rack mount, \$60 OBO; 2 pair rain gutter mount, good condition, \$15. Clark, 281-1243.

COMPUTER, IBM 386, w/monitor, WYSE monitor, Star dot matrix printer; double waterbed; hot spa for bathtub, Kawasaki, \$80 ea. Crosby, 858-3128 evenings.

PANASONIC PRINTER, Impact, dot matrix, model KX-P1123, \$100. Prew, 296-3815.

SAPPHIRE & DIAMOND EARRINGS, new in box, half off at \$350. Eikelberg, 296-0899.

FIFTIES COLLECTIBLES, Hubley farm truck, fire truck, ready-mix concrete truck, tractor/trailer, Wyandotte Van Lines, \$50 ea.; child's firefighter pedal car, \$300. Martin, 296-8154.

SMITH & WESSON 63, .22 cal. stainless revolver, Pachmyer grips, \$320; TC Seneca .45-cal. muzzle loader, \$245. Klett, 884-8354.

SKI CARRIER for Yakima racks, button down 4 w/locks, \$45. Lorence, 275-3586.

NORDICTRAC ACHIEVER, w/options, \$575; pinball machine, needs some work, \$75; rifle cabinet, 6 racks, glass doors, \$100. Edmund, 881-7974.

TWO GARAGE DOOR OPENERS, 1/4HP, \$30 ea./\$50 pair; Schwinn Airlyne exercycle, \$350. Schell, 821-2600.

TRUCK ACCESSORIES for full-size Ford, long bed, chrome headache rack, heavy-duty chrome bedrails, excellent condition, paid \$370, asking \$220. Smith, 888-8811.

STENOGRAPH MACHINE, w/case & stand, excellent condition, paper & speedbuilding tapes included. Gonzales, 877-4914.

TWO EUROPEAN TAPESTRIES, (Gobelins), 39" x 59", new. Sivinski, 296-0301.

DINING TABLE, wood trestle, plus 4 chairs, 2 leafs, \$90; 2 coffee tables, \$5 ea. Hurd, 286-1017.

FOUR RADIAL TIRES, P215/75R15, mounted on GM car rims; 1 pair studded snow, \$50; 1 pair passenger, \$20. Kerschen, 881-7461.

DOUBLE SOFA SLEEPER, \$285; 2 wedding gowns, size 5, one white & one ivory w/veil, \$100; rabbit fur coat, size 5, \$75. Clavey, 292-7667.

THREE COMFORTER SETS, \$30-40 ea.; 2 car seats, \$10-25; potty trainer, \$10. Southward, 281-7858.

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 12622, MS 0413, or fax to 844-0645.

Ad Rules

1. Limit 20 words, including last name and home phone (the Lab News will edit longer ads).
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8 1/2" by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "for rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work wanted" ads limited to student-aged children of employees.

BEDROOM SET, 4-piece, Drexel, bed chiffonier, dresser w/mirror, nightstand, \$250; oak veneer entertainment center, 70"H x 60"W x 17"D, \$100. Norwood, 266-2717.

LITTON MICROWAVE, 700-watts, full size, \$50; Maytag dishwasher, almond, \$25; 30" stove exhaust, hood/light, almond, \$40. Linker, 299-4057.

SANTA CLARA BLACK POTTERY, 3 pcs. (by S. Chavarria, G. Naranjo M. Naranjo), \$750 OBO, Benner, 275-8875.

DESK, roll top, good condition, \$60. Marquez, 344-8455.

REAL ESTATE

FOUR HILLS double wide mobile home, 24' x 60', w/storage, blinds, custom drapes, new roof, vinyl, perfect for young family or retirement, \$20,000. Orand, 275-2255.

NEW CORRALES HOME, Southwest style, vigas, tile, radiant heat, great views, 2,600 sq. ft., paved road, natural gas, CTV. Karler, 298-3265.

FOR RENT, 2-bdm., 2-bath patio home, 1,400 sq. ft., huge yard, dog run, Juan Tabo/Menaul. Garrity, 275-3044

TRANSPORTATION

'87 GMC VAN, full-size, wheelchair lift equipped, 80K miles, well maintained, double AC, PW, PL, couch/bed, new tires, stereo. Shepherd, 296-1238, leave message.

'88 NISSAN SENTRA, 2 door., AT, AC, 89K miles, \$3,400; '79 Jeep Wagoneer, 4 door, 4WD, AT, AC, 162K miles, rebuilt, \$1,000 OBO. Neal, 281-7686.

'72 DATSUN TRUCK, good/solid, new AM/FM cassette, \$800. Skinner, 856-1563.

'82 NISSAN MAXIMA, excellent condition, all new tires, runs like charm, just tuned up, \$2,300. Sparling, 281-4004.

'85 CHEV. SW, 3 seat, new transmission & exhaust system, PW, PL, cassette, cruise, below book, runs good. McKiernan, 255-2277.

'88 FORD MUSTANG 5.0 LX, one owner, 62K miles, new paint, excellent interior/exterior condition, \$5,700. Amundson, 866-1300.

10-SPD MEN'S BICYCLE, Fuji, Suntour shifter, thorn-proof tires, 27" x 1-1/4", w/bike bag, excellent condition, \$50. Anderson, 897-2772.

'87 HONDA 1100 SHADOW, low mileage, excellent condition, below blue book. Bouchard, 265-8148.

'93 JEEP CHEROKEE SPORT, 4 x 4, 6-cyl., white, AC, 2 door, tilt, posi-track, ski-rack, 27K miles, like new, \$14,900. Shannon, 281-3038.

'85 PONTIAC FIREBIRD, white, V-6, AM/FM cassette, AC, good condition, \$2,950. Dunivan, 296-3937.

'89 GMC JIMMY S-15, 4WD, 4.3L., 85K miles, excellent condition, Gypsy pkg., fully loaded, \$8,500 OBO. Linker, 299-4057.

WANTED

ONE COPY of the Martin-Marietta book, *Raise Heaven and Earth*. Caskey, 294-3218

SHARE-A-RIDE, Cedar Crest vanpool has openings, Frost Rd., N-14, Tijeras. Rentzsch, 281-5017 or Burns, 281-3922.

RV, 21-22 ft., below \$10K, low miles preferable. Burns, 281-3922.

CHILD'S CAR BED, (Little Tikes), for use w/crib or twin mattress, for son's big-boy room. Howard, 298-7147.

X-C SKI BOOTS/SHOES, (not thick welt for Telemark), 3-PIN, 75mm, size 11. Shapnek, 281-5913.

REFRIGERATOR, washer, dryer, gas stove, almond color, good condition. Schoechert, 836-3806.

TV ANTENNA, outdoor, roof model, good condition. Vigil, 880-0026.

SLIDE TRAYS for Kodak Carousel slide projector. Coleman, 884-5009.

LOST & FOUND

LOST: gold-bangle bracelet, lost on 12/9/94 between water tower lot & Bldg. 890 or in Bldg. 890. Hill, 845-9825.

FOUND: woman's glasses, pink w/purple trim, south side of Bldg. 880, broken, but I've got them. Yourick, 844-7542.

LOST: Black leather Samsonite briefcase, on Dec. 14 near Gate 6 or parking lot north of Bldg. 852. McDaniel, 845-3006.

Sandian sheds 85 pounds through the TLC program

Commitment, discipline keys to successful weight loss

By Mary Hatheway

Lab News Writing Intern

Suffering a mild stroke two years ago finally convinced Brad Wood (9415) to do what nearly three decades of New Year's resolutions could not: take his weight problem seriously. The Thanksgiving stroke left Brad with neurological damage, along with fears about his poor state of health.

"After the stroke, I started thinking about my health and mortality. I felt like the good Lord was giving me a hint, and I decided I needed professional help," Brad says. "I called TLC just before Christmas in 1992, and Lisa Herzig answered. I said, 'I've got a weight problem.' She told me to come on in, and that's how we started down this path."

Lisa (3335) is a registered dietician with Sandia's Health Promotion Program, Total Life Concept (TLC), and Brad's self-proclaimed "secret weapon" in his weight-loss battle. When Brad went to see Lisa in January 1993, he weighed 363 pounds. Today he weighs 278 pounds, 105 pounds away from his total weight loss goal of 190 pounds.

But both Lisa and Brad agree that the road to his weight loss success has been long and slow.

"There's no quick fix when it comes to losing weight," Lisa says. "You have to make a commitment to being healthy and then have the discipline to stick with it. That's why Brad is my biggest success story — he's come here every week for the past two years and really worked at losing weight. He's made a lifestyle change, and you can see the profound physical changes in him."

Brad, a veteran of many different weight loss programs, attributes his success to the TLC program's attention to both the physical and mental aspects of weight loss. Not only has he learned to exercise, keep food diaries, and count calories and fat grams through TLC, but he has also learned to identify the triggers that cause him to be compulsive about eating, and to alter them.

"Now instead of going home and sticking my face in a trough after a stressful day, I try to go work out or take a walk," Brad says. "I've learned a lot of coping mechanisms to help me manage stress better, and that has translated into a happier and more productive personal and professional life."

'Sleek and svelte by year 2000'

Although he's come a long way, Brad says there is still work to be done. He expects that losing the rest of the original 190 pounds will take another two to three years.

"It took me 30 years to eat myself into this condition, and it's going to take a while to get healthy again. My goal is to be sleek and svelte for my 20th high school reunion, which is in the year 2000," he says.

Brad's advice to others who would like to lose some weight is simple.

"Do something," he says. "Don't wait to have a heart attack or a stroke or get divorced. And, if you're thinking about making a change but don't think you can do it on your own, go see the people at TLC."

Lisa also encourages Sandians to work with a "buddy" at TLC. She notes that the professional staff at TLC includes nutritionists, exercise physiologists, and counselors who can create personalized fitness and nutrition plans, and the program is available to all Sandians at

no charge. TLC is also sponsoring a New Year's resolution assistance program designed to help Sandians meet their weight-loss goals. Interested Sandians can call the TLC office on 844-8238.

"The staff at TLC will work with individuals to help them achieve their goals over the long term, but the best advice I can give to anyone who wants to lose weight is to be realistic about the goals you set for yourself," Lisa says.

Weight management tips from TLC

1. Engage in regular physical activity three to six times per week for a minimum of 30-60 minutes.
2. Maintain good social support. This can include family, friends, and colleagues.
3. Combat relapses by assessing your internal motivation and commitment.
4. Focus on positive changes, and reward yourself for even small steps.
5. Always maintain a balanced diet by keeping your fat intake to 30 percent or less of total calories and choosing foods high in complex carbohydrates and fiber, and low in sugar, salt, and calories.

Fun & Games

Bowling — The SANDOE Bowling Association has announced the winners of its 1993-1994 Bowler-of-the-Year tournament held Dec. 4, 1994. Jerry Long (ret.) bowled a 633 series and Cheryl Barton (spouse) bowled a 586 to win in the scratch category. Reyes Chavez (7433) bowled a 579/663 and Ruby Cochrell (6352) bowled a 491/638 to win in the handicap category.

Bowler-of-the-Month honors for November were awarded to Don MacKenzie (ret.), who bowled a 650, and Sharon Voccio (5905), who bowled a 544, in the scratch category. In the handicap category, Bowlers-of-the-Month Milt Stomp (6200) bowled a

Coronado Club

Jan. 6 (tonight) — Friday night dinner/dance. Dinner served 6-9 p.m. All-you-can-eat-buffet (baked ham, baron of beef, roast turkey breast, poached fish), \$6.95. Music by Isleta Poorboys, 7-11 p.m.

Jan. 8 — Sunday brunch buffet, 10 a.m.-2 p.m. Tea dance, 1-4 p.m., music by Los Gatos. Adult members \$6.95 (less \$1 discount for member and spouse showing membership card), nonmember guests \$7.95, child 4-12 \$2.95 (new price), child 3 and under free.

Jan. 12, 19, 26 — Thursday Bingo nights. Card sales and buffet beginning at 5:30 p.m., early birds' bingo begins at 6:45 p.m.

Jan. 20 — Friday night dinner/dance. Dinner 6-9 p.m. T-bone steak or fried shrimp, \$11.95, all-you-can-eat-buffet (baked ham, baron of beef, roast turkey breast, poached fish, chef's surprise), \$6.95. Music by Three Legged Willie, 7-11 p.m.

A special meeting of the Coronado Club active members is scheduled for 5 p.m., Jan. 24, in the club main ballroom. The purpose is to revise the bylaws to update wording and make them reflect current philosophies of the club. Draft changes and recommendations are available at the club office.

★ Congratulations

To Beverly and David (5111) Cain, a daughter, Brianna Monee, Dec. 9.

644/680 and Dottie Castro (DOE) a 451/643.

SANDOE Bowling Association October Bowlers-of-the-Month include: Scratch — Bob Barton (10221), 716, and Cheryl Barton, 624; Handicap — Pat Sanchez (13915), 582 and 657, and Margret Tibbets, 605 and 695.

Sharon Hickey won the Four-Game No-Tap Tournament held at Fiesta Lanes Oct. 15-16 with a 797 handicap series. Second went to Judy Hansen (10232) with a 776.

Winner of the Four-Game Mixer Tournament held at Holiday Bowl Nov. 12-13 was Reyes Chavez (7433) with a 792 handicap series. Barb Miller took second with a 765.



SCENIC SINGLES — Members of the Sandia/DOE Singles took to the rails recently on the Cumbres and Toltec train out of Chama for an excursion through some great northern New Mexico scenery. This is just one of the club's adventures. For more information about the club call Libby Greene (2612) on 271-0487.